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**ARAC Electrical Systems Harmonization Working Group**  
**Final ARAC ESHWG REPORT 25.869(a)**  
**30 November 1999**

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**1 - What is underlying safety issue addressed by the FAR/JAR?** *[Explain the underlying safety rationale for the requirement. Why does the requirement exist?]*

FAR/JAR 25.869(a) address fire protection of electrical system components and provide specific standards to be met depending on location and type of cables.

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**2 - What are the current FAR and JAR standards?** *[Reproduce the FAR and JAR rules text as indicated below.]*

**Current FAR text:**

**Sec. 25.869 Fire protection: systems.**

(a) Electrical system components:

- (1) Components of the electrical system must meet the applicable fire and smoke protection requirements of Secs. 25.831(c) and 25.863.
- (2) Electrical cables, terminals, and equipment in designated fire zones, that are used during emergency procedures, must be at least fire resistant.
- (3) Main power cables (including generator cables) in the fuselage must be designed to allow a reasonable degree of deformation and stretching without failure and must be--
  - (i) Isolated from flammable fluid lines; or
  - (ii) Shrouded by means of electrically insulated, flexible conduit, or equivalent, which is in addition to the normal cable insulation.
- (4) Insulation on electrical wire and electrical cable installed in any area of the fuselage must be self-extinguishing when tested in accordance with the applicable portions of part I, appendix F of this part.

**Current JAR text:**

**JAR 25.869 Fire protection: systems**

(a) Electrical system components:

- (1) Components of the electrical system must meet the applicable fire and smoke protection requirements of JAR 25.831(c) and JAR 25.863. (See ACJ 25.869 (a)(1).)

- (2) Electrical cables, terminals, and equipment in designated fire zones, that are used during emergency procedures, must be at least fire resistant.
- (3) Main power cables (including generator cables) in the fuselage must be designed to allow a reasonable degree of deformation and stretching without failure and must be -
  - (i) Isolated from flammable fluid lines; or
  - (ii) Shrouded by means of electrically insulated, flexible conduit, or equivalent, which is in addition to the normal cable insulation.
- (4) Insulation on electrical wire and electrical cable installed in any area of the aeroplane must be self-extinguishing when tested in accordance with the applicable portions of Part I, Appendix F.

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**3 - What are the differences in the standards and what do these differences result in?**

*[Explain the differences in the standards, and what these differences result in relative to (as applicable) design features/capability, safety margins, cost, stringency, etc.]*

The regulatory difference is within 25.869(a)(4) where JAR refers to "aeroplane" and FAR refers to "fuselage". The technical need and accepted industry practice and Regulatory Authority application is that all wiring installed in the airframe and engines, (i.e., not just those in the fuselage), is self extinguishing. The JAR text introduced by NPA 25DF-191 is such that the requirement reflects this standard.

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**4 - What, if any, are the differences in the means of compliance?** *[Provide a brief explanation of any differences in the compliance criteria or methodology, including any differences in either criteria, methodology, or application that result in a difference in stringency between the standards.]*

JAR has a specific ACJ related to 25.869(a)(1):

**ACJ 25.869: Electrical System Fire and Smoke Protection (Interpretative Material and Acceptable Means of Compliance)**

**See JAR 25.869**

These requirements, and those of JAR 25.863 applicable to electrical equipment, may be satisfied by the following:

- 1 Electrical components in regions immediately behind firewalls and in engine pod attachment structures should be of such materials and at such a distance from the firewall that they will not suffer damage that could hazard the aeroplane if the surface of the firewall adjacent to the fire is heated to 1100°C for 15 minutes.
- 2 Electrical equipment should be so constructed and/or installed that in the event of failure, no hazardous quantities of toxic or noxious (e.g. smoke) products will be distributed in the crew or passenger compartments.
- 3 Electrical equipment, which may come into contact with flammable vapours should be so designed and installed as to minimise the risk of the vapours exploding under both normal and fault conditions. This can be satisfied by meeting the Explosion Proofness Standards of draft ISO document TC20/SC5/N.43, dated 1974.

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**5 - What is the proposed action?** *[Is the proposed action to harmonize on one of the two standards, a mixture of the two standards, propose a new standard, or to take some other action? Explain what action is being proposed (not the regulatory text, but the underlying rationale) and why that direction was chosen.]*

According to the Better Plan for Harmonization, FAR/JAR 25.869(a) is to be enveloped to the “most stringent” requirement, which is JAR 25.869(a). This is also in line with current design practices.

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**6 - What should the harmonized standard be?** *[Insert the proposed text of the harmonized standard here]*

The current text of JAR 25.869(a) *[see above]* is proposed as the harmonized standard.

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**7 - How does this proposed standard address the underlying safety issue (identified under #1)?** *[Explain how the proposed standard ensures that the underlying safety issue is taken care of.]*

The proposal can be considered as a clarification of existing requirements and in line with current practices.

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**8 - Relative to the current FAR, does the proposed standard increase, decrease, or maintain the same level of safety? Explain.** *[Explain how each element of the proposed change to the standards affects the level of safety relative to the current FAR. It is possible that some portions of the proposal may reduce the level of safety even though the proposal as a whole may increase the level of safety.]*

The proposed standard increases the level of safety because JAR refers to aeroplane while the FAR refers to fuselage only.

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**9 - Relative to current industry practice, does the proposed standard increase, decrease, or maintain the same level of safety? Explain.** *[Since industry practice may be different than what is required by the FAR (e.g., general industry practice may be more restrictive), explain how each element of the proposed change to the standards affects the level of safety relative to current industry practice. Explain whether current industry practice is in compliance with the proposed standard.]*

This proposal is in line with current industry practices and therefore maintains the same level of safety.

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**10 - What other options have been considered and why were they not selected?** *[Explain what other options were considered, and why they were not selected (e.g., cost/benefit, unacceptable decrease in the level of safety, lack of consensus, etc.)]*

The adoption of FAR was considered; however, for the reasons as stated above JAR was selected.

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**11 - Who would be affected by the proposed change?** *[Identify the parties that would be materially affected by the rule change – airplane manufacturers, airplane operators, etc.]*

As the proposal is in line with current design practices, the effect is considered to be minimum for Aircraft Operators and Manufacturers affected by this change.

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**12 - To ensure harmonization, what current advisory material (e.g., ACJ, AMJ, AC, policy letters) needs to be included in the rule text or preamble?** *[Does the existing advisory material include substantive requirements that should be contained in the regulation? This may occur because the regulation itself is vague, or if the advisory material is interpreted as providing the only acceptable means of compliance.]*

No current advisory material is proposed to be included in the rule.

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**13 - Is existing FAA advisory material adequate? If not, what advisory material should be adopted?** *[Indicate whether the existing advisory material (if any) is adequate. If the current advisory material is not adequate, indicate whether the existing material should be revised, or new material provided. Also, either insert the text of the proposed advisory material here, or summarize the information it will contain, and indicate what form it will be in (e.g., Advisory Circular, policy, Order, etc.)]*

There is no current published FAA advisory material. It is recommended that the JAR ACJ to 25.869(a)(1) be adopted in FAA advisory material with modification of reference to draft ISO document TC20/SC5/N.43, dated 1974 by reference to RTCA DO-160/EUROCAE ED-14 which is the up to date document; so that it reads:

**ACJ 25.869: Electrical System Fire and Smoke Protection (Interpretative Material and Acceptable Means of Compliance)**  
**See JAR 25.869**

These requirements, and those of JAR 25.863 applicable to electrical equipment, may be satisfied by the following:

- 1 Electrical components in regions immediately behind firewalls and in engine pod attachment structures should be of such materials and at such a distance from the firewall that they will not suffer damage that could hazard the aeroplane if the surface of the firewall adjacent to the fire is heated to 1100°C for 15 minutes.
- 2 Electrical equipment should be so constructed and/or installed that in the event of failure, no hazardous quantities of toxic or noxious (e.g. smoke) products will be distributed in the crew or passenger compartments.
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**14 - How does the proposed standard compare to the current ICAO standard?** *[Indicate whether the proposed standard complies with or does not comply with the applicable ICAO standards (if any)]*

There is no specific ICAO standard for this subject

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**15 - Does the proposed standard affect other HWG's?** *[Indicate whether the proposed standard should be reviewed by other harmonization working groups and why.]*

This proposal does not affect other HWG's.

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**16 - What is the cost impact of complying with the proposed standard?** *[Is the overall cost impact likely to be significant, and will the costs be higher or lower? Include any cost savings that would result from complying with one harmonized rule instead of the two existing standards. Explain what items affect the cost of complying with the proposed standard relative to the cost of complying with the current standard.]*

As the proposal is in line with current design practices, the cost impact will be negligible. No new designs, testing, equipment installations, or maintenance procedures are anticipated.

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**17 - Does the HWG want to review the draft NPRM at "Phase 4" prior to publication in the Federal Register?**

No.

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**18 - In light of the information provided in this report, does the HWG consider that the "Fast Track" process is appropriate for this rulemaking project, or is the project too complex or controversial for the Fast Track Process. Explain.** *[A negative answer to this question will prompt the FAA to pull the project out of the Fast Track process and forward the issues to the FAA's Rulemaking Management Council for consideration as a "significant" project.]*

The ESHWG considers that the fast track harmonization process is appropriate for this rule.